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ZOOLOGY.—*On a collection of Copepoda made in El Salvador by Samuel F. Hildebrand and Fred J. Foster of the U. S. Bureau of Fisheries.*[1] C. DWIGHT MARSH.

This collection consisted of 15 bottles which were collected by Mr. Hildebrand and Mr. Foster in January and February, 1924. They were taken from the following lakes: Ahuachapan, Chalchuapa, Chamico, Coatepeque, Guija, Ilopango, and Olomega. Ilopango, Coatepeque, Chamico, and Chalchuapa may be classed as deep lakes; Olomega and Ahuachapan as shallow. Hildebrand, 1925, (3),[2] found a depth of 83 meters in L. Coatepeque; he states that Chalchuapa and Chamico are quite deep, that Ahuachapan is shallow, and that Olomega has an average depth of 2 meters. He took a deep water temperature in Lake Guija at a depth of 16 meters; this may have been the maximum depth.

Juday, 1915, (4), gave descriptions and sketch maps of lakes Ilopango and Coatepeque. He found a maximum depth of 215 meters in Ilopango. In Coatepeque he found a maximum depth of 110 meters.

All the collections were made from surface waters. Following is a list of the species found.

Lake Ahuachapan	*Cyclops tenuis* Marsh: *Diaptomus marshi* Juday
Lake Chalchuapa	*Cyclops tenuis* Marsh; *Diaptomus marshi* Juday
Lake Chamico	*Diaptomus siciloides* Lilljeborg
Lake Coatepeque	*Cyclops leuckarti* Claus; *Cyclops tenuis* Marsh
Lake Guija	*Cyclops albidus* Jurine; *Cyclops tenuis* Marsh; *Diaptomus* sp. all immature.

[1] Received April 1, 1931.
[2] Numbers in parenthesis refer to papers cited in the bibliography.

Lake Ilopango	*Diaptomus siciloides* Lilljeborg
Lake Olomega	*Cyclops leuckarti* Claus; *Diaptomus marshi* Juday.

It will be noticed that very few species were found, but it must be remembered that the collections were made within a short period of time and can be considered as representative of only the January and February fauna. The fact that the collections were all made at the surface must also be considered, for under certain conditions most of the mature copepods are found beneath the surface. This is shown in Juday's (1915, p. 247) report of Lake Atitlan, in which no mature forms were found in the 0—5 meter collection, while large numbers appeared between 5 and 30 meters.

The special interest of these collections is in the addition to our knowledge of the distribution of these species. Juday's paper, 1915, is the only preceding paper dealing with the Copepoda of El Salvador.

Notes in Regard to the Species

No importance attaches to the presence of *Cyclops albidus* and *Cyclops leuckarti*. Both species are cosmopolitan, and may appear in any collections.

Cyclops tenuis Marsh

This is the first record of *C. tenuis* in El Salvador. The species was described from material collected at Calabasas, Arizona. It is closely related to *C. leuckarti* from which it is distinguished by being smaller and more slender, with few (generally four) ova in each egg sac, lack of armature of the terminal segments of the female antennae, and the form of the *receptaculum seminis*. It was found in many localities in the Panama Canal Zone, Marsh 1913, (5), Dodds, 1926, (2), and was considered one of the most characteristic species of that region. It was found in Lakes Ahuachapan, Chalchuapa, Coatepeque, and Guija. It is to be presumed that eventually it will be found in other localities in Central America and Mexico.

Diaptomus siciloides Lilljeborg

Juday, 1915, has already reported *D. siciloides* from Lake Ilopango and Lake Coatepeque. In the Hildebrand and Foster collections it was found not only in these lakes but also in Lake Chamico. As shown by Marsh, 1929, (7), it is very widely distributed in the central and western United States. Since that publication it has been reported by Bajkov, 1930, (1), in Lake Winnepegosis, and has been found by Wright in Lake Erie. El Salvador is the most southern location and it has not been reported between that region and Texas.

In the United States, *D. siciloides* is found generally in small bodies of water. Possibly it may be somewhat significant that in El Salvador, it has, so far, appeared only in deep lakes.

Diaptomus marshi Juday

Juday, 1915, reported *D. marshi* from Puerto Barrios and Los Amates, Guatemala, and wrote his description from material collected at those local-

ities. Marsh, 1913, (5), reported it in the Panama Canal Zone and in 1919 (6), from Honduras. In the El Salvador collections it was found in Lakes Chalchuapa, Olomega, and Ahuachapan, and Pearse, 1915, (8), found it in Colombia. *Diaptomus columbiensis* Thiebaud 1914, (9), also collected in Colombia, is a synonym of *D. marshi*. So far as our present knowledge is concerned, it has a somewhat limited distribution, being confined to Guatemala on the north and Colombia on the south. While not found in all localities, it is not a rare species and in Lake Ahuachapan occurred in large numbers. Its preferred habitat is in shallow water or pools, while *D. siciloides*, as stated above, is found, in El Salvador, in deep bodies of water.

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ZOOLOGY.—*Three new pumas.*[1] E. W. NELSON and E. A. GOLDMAN, Biological Survey, U. S. Department of Agriculture.

Further study of the large American cats assigned to *Felis concolor* Linné has resulted in the segregation of three geographic races which, in addition to those recently characterized by the authors (Journ. Mamm., **10**: 345–350, November 11, 1929), seem worthy of distinctive names.

Felis concolor kaibabensis, subsp. nov.

Kaibab Mountain Lion

Type.—From Powell Plateau, Grand Canyon National Park, Arizona (altitude 8,700 feet). No. 171186, ♂ adult, U. S. National Museum (Biological Survey collection), collected by J. T. Owens, April 15, 1911. X number 8432.

[1] Received April 15, 1931.

General characters.—A large, long-haired, pallid subspecies, with dark median dorsal area comparatively ill defined, the general tone, merging with less contrast than usual into that of sides of back, owing in part to a reduction of the overlying black wash present in most forms of the group; skull large, narrow, and elongated. Most closely allied to *F. c. hippolestes*, but generally paler, the dark median dorsal area less clearly defined; skull narrower. Larger than *F. c. azteca*, and differing otherwise in about the same characters as from *hippolestes*. Differing from *F. c. californica* in larger size, paler color, and relatively narrower skull. Closely resembling *F. c. browni* in color, but larger and cranial characters distinctive.

Color.—Type: Top of head, neck, and rather poorly defined median dorsal area to base of tail light tawny, very thinly and inconspicuously overlaid with black, the tawny element deepest along lower part of back and rump, paling gradually through cinnamon buff on sides of neck, shoulders, along flanks and on outer surfaces of limbs to pale pinkish buff on feet; lips, lower part of cheeks, chin, throat, chest, and inguinal region white; under surface of neck suffused with pinkish buff; belly overlaid on sides with pale pinkish buff, becoming whitish along median line; inner sides of limbs dull white, the drab basal color showing through; face in general buffy gray, with large whitish, supraorbital spots; blackish areas at base of vibrissae on sides of muzzle rather inconspicuous; ears blackish externally, broadly edged with gray extending also in a band across middle, thinly clad internally with white hairs; hairs around pads on feet brownish black; tail above light tawny, becoming dull pinkish buffy below to tip which is black, the black extending forward about three inches on upper side.

Skull.—Very similar to that of *F. c. hippolestes*, but narrower and relatively more elongated, less rounded in general outline as viewed from above; zygomata less widely spreading; interpterygoid fossa narrower; dentition about the same. Similar in general to that of *F. c. azteca*, but larger and differing otherwise in the same proportions as from *hippolestes*. Larger and more elongated than that of *F. c. californica*, with flatter frontal region and relatively less widely spreading zygomata. Approaching that of *F. c. browni* in narrowness, but decidedly larger, with heavier dentition.

Measurements.—Skull of type (no reliable measurements of body available): Greatest length, 216.8 mm.; zygomatic breadth, 141.6; interorbital breadth, 43.4; least width between outer walls of interpterygoid fossa, 29; alveolar length of upper canine-premolar series, 62.4; crown length of upper carnassial, 22.5.

Remarks.—The mountain lions of the Kaibab plateau north of the Grand Canyon of the Colorado River in northwestern Arizona, southwestern Utah and central and eastern Nevada, assigned to this subspecies, are closely allied to *F. c. hippolestes* which has an extended range from north to south in the Rocky Mountain region. While the differential characters are comparatively slight they are exhibited so consistently by the material examined that separate recognition by name seems necessary in order to clarify the relationships of neighboring forms.

Felis concolor anthonyi, subsp. nov.

Venezuelan Puma

Type.—From Playa del Rio Base, Monte Duida, Territorio de Amazonas, southern Venezuela. No. 76935, ♂ adult, American Museum of Natural History, collected by Olalla Brothers, November 22, 1928.

General characters.—A large, short-haired, rusty reddish subspecies, with a massive skull. Similar in size to *F. c. wavula*, but type somewhat darker in general tone than specimens referred to that form, and skull differing in important details. Differing from *F. c. bangsi* and *F. c. söderstromi* in more rufescent coloration and cranial features.

Color.—Type: Upper surface of neck and median dorsal area to base of tail near ferruginous or hazel, moderately mixed with black especially on the rump, becoming light tawny on sides of neck, shoulders, along flanks and outer sides of limbs, paling to near light pinkish cinnamon on feet; lips, except near base of vibrissae, chin and throat white; under surface of neck suffused with light pinkish cinnamon; chest, inner sides of limbs, inguinal region, and median line of abdomen dull white; sides of abdomen invaded by irregular light tawny spots; top of head ferruginous mixed with black; face in general buffy brownish; a conspicuous black area at base of vibrissae; ears black externally, thinly clothed internally with whitish hairs; hairs around pads on feet blackish; tail above buffy brownish, with a blackish median line, below dull buffy becoming black all around at tip which is tufted.

Skull.—Size large and structure massive. Similar in general to that of *F. c. bangsi*, but much larger; interpterygoid fossa much broader; auditory bullae larger; dentition similar, but heavier. Not very unlike that of *F. c. söderstromi*, but larger; ascending branches of premaxillae ending on maxillonasal suture (premaxillary endings slightly deflected outward and incising maxillae in *söderstromi*); jugal reaching farther posteriorly, well into plane of glenoid fossa; auditory bullae larger; dentition similar but heavier. Compared with that of *F. c. wavula* the skull is broader; frontal region much broader; nasals more highly arched, less flattened anteriorly; ascending branches of maxillae less compressed, or "pinched in" laterally; interpterygoid fossa much broader; auditory bullae large as in *wavula*; dentition similar, but upper carnassial with internal cusp less prominent.

Measurements.—Type: Total length, 1720 mm.; tail vertebrae, 725; hind foot, 245. *Skull* (type): Greatest length, 205; zygomatic breadth, 143.5; interorbital breadth, 41.2; least width between outer walls of interpterygoid fossa, 33.3; alveolar length of upper canine-premolar series, 62.5; crown length of upper carnassial, 23.5.

Remarks.—Although based on a single specimen, a fine adult male, the characters presented by the type of *F. c. anthonyi* seem clearly beyond the range of individual variation in any of the forms described. From the Monte Duida region, near the upper Orinoco River, it may range into much of the upper Amazon Valley. The width of the interpterygoid fossa is remarkable and equalled in the known forms of the group only in *F. c. pearsoni* and *F. c. puma* which are widely different in other respects. This new puma is named for Mr. H. E. Anthony, Curator of Mammals, American Museum of Natural History, in recognition of his extensive explorations and research on the mammals of South America, and to whom we are indebted for the privilege of describing it.

Felis concolor greeni, subsp. nov.

East Brazilian Puma

Type.—From Curraes Novos, Rio Grande do Norte, Brazil. No. 249896, ♂ adult, U. S. National Museum (Biological Survey collection), collected by Edward C. Green, November, 1930.

General characters.—A small, short-haired, rich rusty reddish subspecies, with small but robust skull and remarkably small teeth. Apparently not very closely allied to any known form. Similar in general to *Felis concolor concolor*, but much smaller, and cranial characters distinctive. Not very unlike *F. c. wavula* and *F. c. osgoodi* in color, but much smaller and skull quite different.

Color.—Type: Top of head, neck, and median dorsal area to base of tail rich cinnamon rufous, very thinly mixed with black, the general rufescent tone most intense along lower part of back and rump, becoming light tawny on sides of neck, shoulders, along flanks and on outer surfaces of limbs, paling gradually to near light pinkish cinnamon on feet; lips, except near base of vibrissae, chin and throat white; chest, inner sides of limbs, and inguinal region dull whitish; abdomen whitish, the sides with irregular but rather distinct light tawny spots; face in general buffy brownish; ears blackish externally, thinly clothed internally with whitish hairs; hairs around pads on feet brownish black; tail above ochraceous tawny rather heavily mixed with black along the median line, below ochraceous buffy, the tip tapering and lacking a distinct black terminal tuft.

Skull.—Skull small, short, rounded and rather heavy. Similar in general to that of *F. c. concolor*, but much smaller; frontal region actually as well as relatively broader and flatter; nasals relatively narrower, more pointed posteriorly, less decurved along median line anteriorly; interpterygoid fossa relatively narower; auditory bullae relatively much smaller, more flattened, less inflated in front of meatus; jugal extending posteriorly to plane of glenoid fossa about as in *concolor;* dentition similar but much lighter, the individual teeth much smaller, except vestigial premolars and molars which are rather large. Compared with that of *F. c. wavula* the skull is smaller; frontal region broader; ascending branches of maxillae not compressed or "pinched in" laterally as in *wavula;* interpterygoid fossa narrower; auditory bullae smaller, less inflated anteriorly; dentition much lighter; upper carnassial with internal cusp less developed. In general form the skull somewhat resembles that of *F. c. osgoodi*, but is much smaller and differs in detail, the rostrum being less compressed laterally, the auditory bullae relatively smaller and dentition much lighter.

Measurements.—Skull of type (no measurements of body available): Greatest length, 189 mm.; zygomatic breadth, 132.6; interorbital breadth, 43.1; least width between outer walls of interpterygoid fossa, 26.6; alveolar length of upper canine-premolar series, 52.8; crown length of upper carnassial, 20.

Remarks.—Felis c. greeni from extreme eastern South America requires no very close comparison with any known form. In essential characters, however, it agrees so closely with the other subspecies that the use of a trinomial name seems fully warranted. It is readily distinguished by small size and remarkably small teeth. The canines are especially short and weak. The new form is named for the collector of the type, Mr. Edward C. Green, a collaborator of the Biological Survey for many years.

ENTOMOLOGY.—*On certain hymenopterous parasites of stored-grain insects.*[1] A. B. GAHAN, Bureau of Entomology. (Communicated by HAROLD MORRISON.)

The recent untimely death of my good friend and colleague, Dr. James Waterston of the British Museum, brought to an end a correspondence and in later years a warm personal friendship covering a period of more than ten years, during which time Dr. Waterston's whole-hearted and efficient cooperation was a source of very great helpfulness and pleasure to me. Shortly before his death in April, 1930, we became mutually interested in solving the identity of certain parasites of stored-grain insects and had made considerable progress when the project was interrupted. Fortunately the assistance of Dr. Ch. Ferriere, of the Imperial Bureau of Entomology, has made it possible to complete the investigation, in part at least, and the results which deal with certain species of Bethylidae are deemed worthy of publication at this time.

BETHYLIDAE

Plastanoxus westwoodi (Kieffer)

Figs. 1, 2, and 3.

Cephalonomia formiciformis var. Westwood, Trans. Ent. Soc. London, 1881, p. 127, pl. 6, fig. 4; male, female.

Cephalonomia westwoodi Kieffer, Das Tierreich, Bethylidae, 41 Lieferung, 1914, p. 248.

The species *Cephalonomia formiciformis*, which is type of the genus *Cephalonomia*, was described by Westwood in 1833[2] from specimens reared from a fungus growing in the neighbourhood of London. In 1833, Westwood republished the description and figured both sexes of the species. In his remarks he stated that he had received specimens of both sexes collected in Indian corn from Africa. In addition to figuring the winged and wingless forms of the female as well as the male of typical *formiciformis*, he published without further comment figures of the head, antenna, and wing of a male obtained from Indian corn. Apparently on the basis of Westwood's figures, Kieffer recognized the form from Indian corn as different from typical *formiciformis* and gave to it the name *Cephalonomia westwoodi* Kieffer.

Both the British Museum and the United States National Museum had accumulated a considerable number of specimens of Bethylidae reared from various lots of grain infested by beetles and some of this material obviously belonged to the genus *Cephalonomia*. Waterston found what he believed to be two species of this genus among his material and I discovered what I believed to be the same two forms in the material of the United States

[1] Received March 24, 1931.

[2] Mag. Nat. Hist., 6: 421, fig. 55. 1833; female.

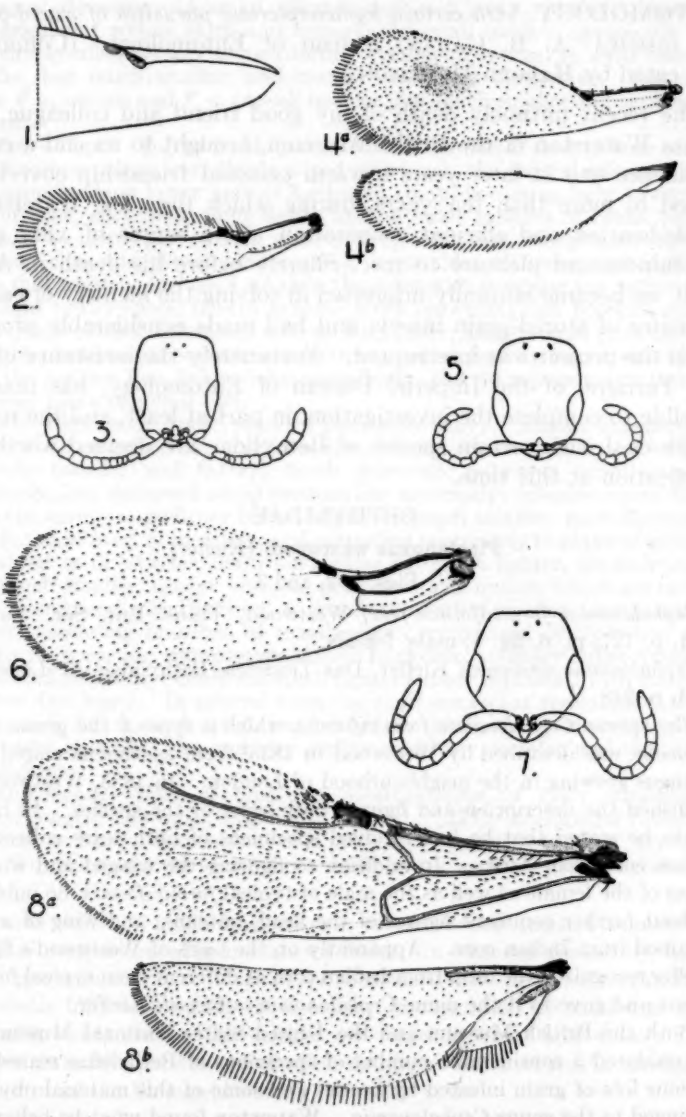

Fig. 1. Copy of Westwood's original figure of the wing of *Cephalonomia formiciformis*, variety from Indian corn, later named *Plastanoxus westwoodi* by J. J. Kieffer.
Fig. 2. *Plastanoxus westwoodi* (Kieffer). Forewing as it actually is.
Fig. 3. *Plastanoxus westwoodi* (Kieffer). Head of female.

National Museum. One of these species we recognized as being *C. tarsalis* (Ashmead). The other seemed to agree rather closely with Westwood's figures and Kieffer's description of *C. westwoodi* Kieffer. In order to settle the identity of this species the writer suggested to Waterston that he endeavor to see the type of *C. westwoodi*, which was believed to be in the Hope Museum at Oxford. Through the cooperation of Prof. E. B. Poulton of Oxford the desired specimens were located and turned over to Waterston for study. The types, which were easily identified by the labels, consisted of two females and a single male mounted on cards. After a preliminary examination of these types Waterston wrote me in January, 1930, as follows: "I have struck rather a snag regarding *Cephalonomia*. There appears to be some slight difference between the antennae of the African type specimens and the examples which you and I have gathered. I am quite convinced, however, that our gatherings contain the same forms, and I shall send you my collection whenever I have come to a definite conclusion on the matter". In February he again wrote me, saying, "I have obtained permission from Prof. Poulton to send you one of the original examples of *Cephalonomia* first described by Westwood as a variety of the common British form and later described by Kieffer. I do not think that this Westwood material is identical with our gatherings but I should like you to see the insect and form your own opinion. I am also sending you my own grain-pest material of the genus which is quite comparable with the material you have been collecting. It may interest you to see what I have". This material arrived later in good shape and proved very interesting.

At first examination the Westwood specimen, a female, appeared to be a *Cephalonomia* but did not seem to agree with either of the two species of that genus represented in the grain-pest material before me. The specimen was glued to the card in such a way that the wing venation was only partly visible. By moistening one wing very slightly it was found possible to raise it from the card without detaching it from the specimen. When examined in its original position on the card, the venation appeared almost exactly as figured by Westwood, but when raised from the card it immediately became evident that this specimen at least had a long radial vein which was entirely lacking in the figure. Since the radial vein is lacking in typical *Cephalonomia* this specimen was run through Kieffer's key to the genera of Bethylidae and found to run directly to *Plastanoxus* Kieffer, the genotype of which is *P. chittendeni* (Ashmead).

Fig. 4. *Cephalonomia waterstoni* Gahan. a, forewing: b, hind wing.
Fig. 5. *Cephalonomia waterstoni* Gahan. Head of female.
Fig. 6. *Cephalonomia tarsalis* (Ashmead). Forewing.
Fig. 7. *Cephalonomia tarsalis* (Ashmead). Head of female.
Fig. 8. *Rhabdepyris zeae* Waterston. a, forewing: b, hind wing.
All figures greatly enlarged. Drawings were made by ELEANOR A. CARLIN, artist of the Bureau of Entomology.

When compared with the types of *chittendeni*, which are in the United States National Museum collection, the specimen proved to be congeneric but a different species.

However, a review of Westwood's original remarks revealed the specific statement that his figures of the insect from grain were drawn from the male. The question then presented itself whether the male figured by Westwood (and therefore the holotype of the species) and the female examined by me were in reality the same species. Not having seen the male type I was in no position to answer this question. In the meantime Waterston's fatal illness developed and he passed away.

Fortunately Mr. Ch. Ferriere located the male specimen in question among other material on Waterston's desk, and he has recently informed me that he has compared this specimen with the female and found them to be specifically identical in venation as well as otherwise.

It is certain therefore that the figures by Westwood of the insect from Indian corn are incomplete (see Figs. 1 and 2) and that the so-called *Cephalonomia westwoodi* Kieffer is not a *Cephalonomia* but belongs in the genus *Plastanoxus*. The species is very similar to *Plastanoxus chittendeni* but may be easily distinguished. The following key will suffice to distinguish the three known species of the genus *Plastanoxus* Kieffer. Only *P. westwoodi* is known to be a parasite of stored-grain pests.[3]

KEY TO THE KNOWN SPECIES OF *Plastanoxus* KIEFFER

1. Forewing with median and submedian cells complete and distinct. Propodeum with a very distinct and complete median longitudinal carina. Radial vein extending fully two-thirds of the distance to wing-apex. **P. laevis** (Ashmead)

   Forewing with median and submedian cells effaced. Propodeum without longitudinal carina. Radial vein reaching less than two-thirds of distance to apex of wing.

2. Radial vein extending a little more than half the distance from its origin to the apex of wing; head of the female viewed from in front fully one and one-half times as long as broad, about 18:11, its sides nearly parallel; female antennae short, none of the flagellar joints except the apical one longer than broad, the first and second flagellar joints distinctly broader than long, apical joint ovate and nearly twice as long as broad; male head 13:12; male antennae longer than in the female, the flagellar joints except the first and second all slightly longer than broad, first and second nearly quadrate, apical joint twice as long as broad. Eyes in both sexes situated much nearer to the mouth than to the vertex. Pronotum distinctly more than twice as long as mesoscutum; propodeum twice as long as scutellum..... **P. westwoodi** (Kieffer)

   Radial vein extending distinctly less than half the distance from its origin to apex of wing. (Female unknown.) Head of male scarcely longer than broad, about 15:14, its sides rounded; antennae longer, all

[3] The species *Bethylus musculus* Say which is referred to *Plastanoxus* by Kieffer is known only from the original description. It may or may not belong here. It apparently differs from all of those included in the key by having the "feet honey-yellow."

flagellar joints distinctly a little longer than broad, the first and second not or scarcely shorter than the others, apical joint more than twice as long as broad. Eyes not or very little nearer mouth than vertex. Pronotum not twice as long as mesoscutum; propodeum not quite twice as long as scutellum..... **P. chittendeni** (Ashmead)

Plastanoxus kiefferi is a slender species, 1 to 1.25 mm. in length, wholly black except the tarsi which are yellowish; head wholly smooth, impunctate, and shining; pronotum, mesoscutum, and scutellum also polished, parapsidal grooves absent; propodeum longer than broad, finely and distinctly punctate

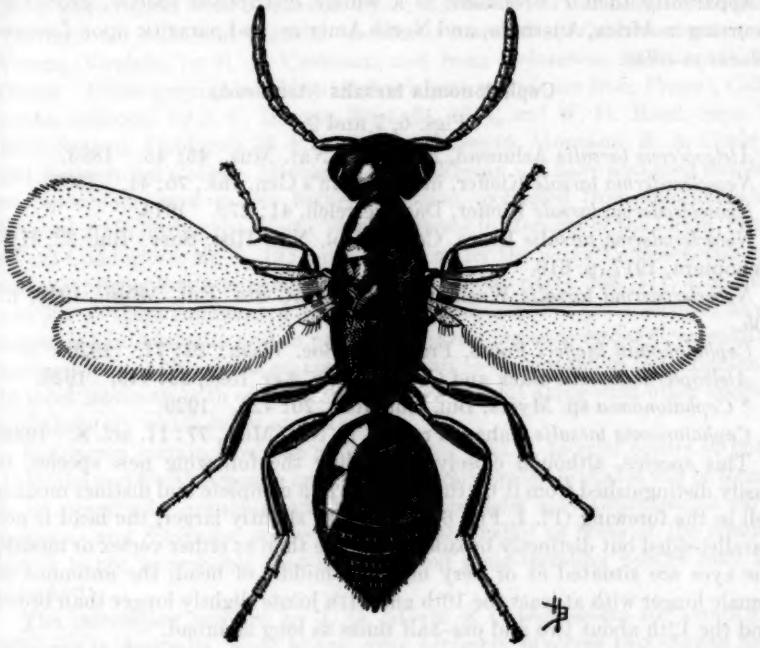

Fig. 9.—Adult female of *Cephalonomia tarsalis* Ashmead. (Greatly enlarged.) Drawing by H. BRADFORD.

basally, the dorsal apex mostly polished; abdomen practically smooth, the tergites beyond the first very faintly reticulated.

In addition to the type female already mentioned, the writer has seen the following material: Fourteen specimens (2 males and 12 females) in the United Station National Museum, reared at Washington, D. C., from the pupal cell of *Laemophloeus* (*Cryptolestes*) *pusillus* Schönherr, by R. T. Cotton March 16, 1925; one male in the British Museum tentatively identified by Waterston as *Cephalonomia* sp. in Reports of the Grain-Pests (War) Commit-

tee, No. 9, and shown in that report (see page 51, No. 324) to have been collected at Plymouth, England, from a shipment of grain from Sydney, Australia, which was infested by several different species of beetles, one of which was the species above named; one previously unidentified specimen, also in the British Museum, bearing the number 381, which number undoubtedly refers to the shipment of grain mentioned in the above-named report (see page 48, No. 381) as having been received at Sunderland, England, from Freemantle, Western Australia, and which was likewise infested by several species of beetles of which *L. pusillus* was one.

Apparently then *P. westwoodi* is a widely distributed species, probably occurring in Africa, Australia, and North America, and parasitic upon *Laemophloeus pusillus*.

Cephalonomia tarsalis (Ashmead)

Figs. 6, 7 and 9.

Ateleopterus tarsalis Ashmead, Bul. U. S. Nat. Mus., **45**: 45. 1893.

Neoscleroderma tarsale Kieffer, in Wytsman's Gen. Ins., **76**: 41. 1908.

Neoscleroderma tarsale Kieffer, Das Tierreich, **41**: 270. 1914.

Neoscleroderma tarsalis Brues, Conn. Geol. Nat. Hist. Surv. Bul. 22, Hymenoptera, 1917, p. 610.

Neoscleroderma tarsalis Washburn, 17th Rept. Sta. Ent. Minn., 1918, p. 205.

Cephalonomia kiefferi Fouts, Proc. Ent. Soc. Wash., **22**: 71. 1920.

Ateleopterus tarsalis Back and Cotton, Jour. Agr. Res., **33**: 449. 1926.

? *Cephalonomia* sp. Myers, Bul. Ent. Res., **20**: 428. 1929.

Cephalonomia tarsalis Gahan, Proc. U. S. Nat. Mus., **77**: 11, art. 8. 1930.

This species, although closely resembling the following new species, is easily distinguished from it by the presence of a complete and distinct median cell in the forewing (Pl. I, Fig. 6). It is also slightly larger, the head is not parallel-sided but distinctly broader at middle than at either vertex or mouth, the eyes are situated at or very near the middle of head, the antennae of female longer with at least the 10th and 11th joints slightly longer than broad and the 12th about two and one-half times as long as broad.

Female.—Length 1.7 to 2 mm. Shining black, the antennal scape black, flagellum brown to brownish black, all tarsi and usually the anterior tibiae reddish yellow; wings hyaline, the venation brownish.

Head pronotum, mesoscutum, and scutellum with fine shallow reticulate-punctate sculpture; propodeum dorsally very distinctly and nearly uniformly reticulate-punctate and with a very distinct and usually complete median longitudinal carina; abdomen as long as thorax, ovate, smooth, the third, fourth, and fifth tergites each with an arcuate depression before the apex, this depressed area defined anteriorly by more or less of a ridge which is more prominent laterally than at middle.

Male.—Similar in every way to the female except that the antennae are entirely black, more slender than in female, joints 3 to 11 each twice or nearly twice as long as broad, joint 12 three times as long as broad; abdomen shorter than the thorax, ovate.

Redescribed from the types and 40 additional specimens in the United States National Museum.

Cephalonomia tarsalis was originally described from specimens reared from *Oryzaephilus surinamensis* (Linnaeus) collected at Lafayette, Indiana, and Washington, D. C. The above cited references by Kieffer, Brues, and Washburn are for the most part merely repetitions of this original record. Back and Cotton record the species from Washington, D. C., reared from the same host and also from Texas from an unidentified host. The types of *C. kiefferi* Fouts, which species was synonymized with *tarsalis* by Gahan in 1930, were reared from *Sitophilus oryzae* (Linnaeus) at Wellington, Kansas. The national collection contains specimens reared from *O. surinamensis* at Vienna, Virginia, by R. A. Cushman, and from Columbus, Ohio, by O. E. Gahm. Other specimens without definite host records are from Fresno, California, collected by J. C. Hamlin, Sept. 24, 1924, and W. D. Reed, Sept. 7, 1925; Saticoy, California, S. E. Flanders; Bozeman, Montana, R. A. Cooley; and Agricultural College, Michigan, D. B. Whelan. I have also seen numerous specimens, now in the British Museum, collected from shipments of infested grain during the World War and listed in Reports of the Grain Pests (War) Committee, No. 9, 1921, pp. 50–52, under the name *Cephalonomia* sp. and comprising lots numbers 201, 206, 222, 324 (in part), 358, 371, 378, 382, and 387 as there enumerated. All of these shipments of grain seem to have originated in Australia and in practically every instance either *Oryzaephilus surinamensis* or *Sitophilus oryzae* were found to be present in the shipment. In most instances both of these species were present along with other species of Coleoptera which infest stored grain.

It appears certain from the above records that *C. tarsalis* occurs in both Australia and North America and it seems highly probable that it will be found to be practically cosmopolitan. The records show only *Oryzaephilus surinamensis* and *Sitophilus oryzae* definitely established as hosts of the species but it is not improbable that other related grain-infesting beetles may be attacked.

The interesting account by J. G. Myers of *Cephalonomia* sp. attacking *Silvanus* in Australia, cited above, very probably involves this species and may also involve the following species. Myers states that Waterston recognized the species as identical with the species collected by the Grain Pests (War) Committee. Waterston, I believe, was not aware at that time that this material included two species and it is impossible to tell from Myers's account which species he had under observation.

Cephalonomia waterstoni, new species

Figs. 4 and 5

Readily distinguished from *C. tarsalis* by the absence of a complete median cell in the forewing, the more nearly parallel-sided head, and the fact that the eyes are situated below the middle of the head.

Female.—Length 1.6 mm. Black and shining; mandibles, pedicel, and first flagellar joint more or less, and all tarsi yellowish; antennal flagellum and the tibiae brownish black; wings hyaline or with a very faint discal cloud. Head viewed from in front longer than broad (20:16), the sides nearly parallel or very slightly convex; eyes situated much nearer to mouth than to vertex, about their own length below vertex; ocelli distinct, in an equilateral triangle; whole head finely reticulate-punctate. Antennae inserted at clypeus, 12-jointed; scape two and one-half to three times as long as broad, pedicel about one and one-half times as long as broad, joints 3 to 11 subquadrate, joint 12 about twice as long as broad. Thorax flattened dorsally and with reticulate-punctate sculpture like the head; pronotum about three times the length of mesoscutum, much narrower anteriorly than posteriorly; mesoscutum without longitudinal grooves; scutellum distinctly longer than mesoscutum, with a short groove or pit on either side of base; propodeum flat, in the same plane as scutellum, as long as pronotum, distinctly narrower at apex than at base, sculptured like the thorax, finely margined laterally and at apex of dorsum, a very delicate median longitudinal carina present or absent, the lateral and posterior faces sculptured like the dorsum. Wings (see Pl. I, Fig. 5) well-developed, the prostigma and pterostigma very small, other veins except the submarginal effaced, the forewing without basal cells. Legs normal, the femora moderately swollen, the hind tarsi longer than their tibiae. Abdomen ovate, a little broader than the thorax and subequal to it in length, smooth and polished, the third tergite with a barely perceptible suggestion of a depression on each side of the middle.

Male.—Unknown.

Type-locality.—Australia.

Type.—Cat. No. 43361, U. S. N. M.

Described from 11 female specimens taken at quarantine in Washington, D. C., by E. A. Back from a shipment of grain the original source of which was said to be Australia; also four females collected from stored corn at Baton Rouge, Louisiana, November 12, 1928, by C. O. Hopkins, and bearing Louisiana Agricultural Experiment Station No. 1511; also one female taken at Urbana, Illinois, January 26, 1927, by W. V. Balduf.

I have likewise seen numerous specimens now in the British Museum, the same being those listed in the Royal Society's 9th Report of the Grain Pests (War) Committee, 1921, listed under the name *Cephalonomia* sp. (p. 50) and comprising the lots numbered 247, 262, 266, 347, 348, 349, 370, 384, 386, 389, and 390 of that report. According to that report one or more of the following species of Coleoptera were present in each of these shipments of grain: [*Calandra*] *Sitophilus oryzae* (Linnaeus), [*Calandra*] *Sitophilus granaria* (Linnaeus), *Tribolium castaneum* (Herbst), *T. confusum* Duval, *Rhizopertha dominica* (Fabricius), [*Silvanus*] *Oryzaephilus surinamensis* (Linnaeus), *Laemophloeus pusillus* (Schönherr), *Anthicus floralis* (Linnaeus), *Carpophilus dimidiatus* (Fabricius), *Tenebroides mauritanicus* (Linnaeus), and [*Cathartus*] *Ahasverus advena* (Waltl).

The species has not been associated with any definite host but is in all probability parasitic upon one or more of the Coleoptera which infest stored grain. It is apparently established in Australia and North America and probably occurs elsewhere.

As pointed out in discussion of *C. tarsalis*, the account by J. G. Myers of *Cephalonomia* sp. in Australia may possibly involve this species.

Cephalonomia meridionalis Brèthes

Cephalonomia meridionalis Brèthes, An. Mus. Nac. Hist. Nat. Buenos Aires, **24**: 87. 1913.

This species is unknown to the writer. It is said to be parasitic upon [*Silvanus*] *Oryzaephilus surinamensis* (Linnaeus) in Argentina.

It apparently differs from both of the foregoing species by having the coxae testaceous.

Cephalonomia sp.

Cephalonomia sp. Grandi, Bol. Lab. Ent. R. Ist. Super. Agr. Bologna, **2**: 301–314, figs. 1–9. 1929.

Grandi describes and figures a species reared from *Sitodrepa panicea* Linnaeus in Italy as *Cephalonomia* sp. He was unable to identify this insect specifically.

This species is evidently different from either *C. tarsalis* or *C. waterstoni*. The head resembles that of *waterstoni*, but the venation is more reduced, the prostigma and pterostigma apparently effaced in the alate male, while the female is wingless.

Rhabdepyris zeae Waterston

Rhabdepyris zeae Waterston, 9th Rept. Grain Pests (War) Committee, Roy. Soc. Lond., 1921, p. 27, figs, 14 and 15; Gahan, Proc. U. S. Nat. Mus., **77**: 12, art. 8. 1930.

Originally described from a specimen taken at Liverpool, England, in a shipment of grain from Africa. The writer has recently recorded its occurrence in stored grain at Lafayette, Indiana, and Baton Rouge, Louisiana, as a probable parasite of *Tribolium confusum*. Five specimens more recently received were reared from stored grain at Brownwood, Texas, by J. L. Gardiner.

The wings of this species are figured for comparison with the other species (see Pl. I Fig. 8).

Parepyris sylvanidis Brèthes

Parepyris meridionalis Brèthes, An. Mus. Nac. Nat. Hist. Buenos Aires, **24**: 87. 1913.

This species is unknown to me. It is said to be parasitic upon [*Silvanus*] *Oryzaephilus surinamensis* in Argentina.

Parepyris is characterized by Brèthes as a new and monobasic genus. At about the same time Kieffer (Boll. Lab. Zool. Portici, **7**: 108. 1913) proposed *Parepyris* as a new genus with *Epyris interruptus* Kieffer as the genotype. *Parepyris* Kieffer and *Parepyris* Brèthes are apparently different genera but the writer is unable at present to determine which has priority, as the exact date of publication of Kieffer's paper is not clear.

ENTOMOLOGY.—*Notes on* Gypona octolineata (*Say*).[1] J. W. SCRIVENER, Bureau of Entomology, U. S. Department of Agriculture. (Communicated by J. S. WADE.)

In connection with the investigations of leafhoppers that are being carried on by the Bureau of Entomology at Arlington Experiment Farm (post office, Rosslyn, Virginia), some seedling apple trees grown on the experiment farm and apparently infested with some species of leafhoppers were brought into the greenhouse January 10, 1930. By

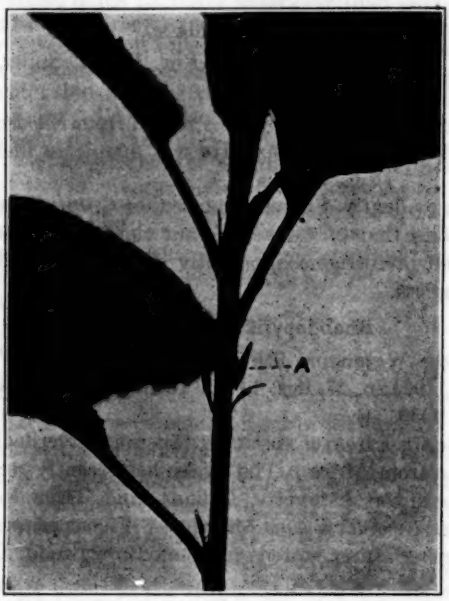

Fig. 1.—Nymph of *Gypona octolineata* on apple stem at A. When this nymph was photographed it had not settled down to feeding, so the head is not in contact with the stem; neither is the abdomen curved outward from the stem in the usual manner, in which position the mimicry of the stipules is most pronounced.

January 28 a number of nymphs of *Gypona octolineata*[2] had hatched out on them. These were kept upon seedling apple plants in celluloid cages in order that their development might be studied. The entire nymphal development of a single individual of this species was observed. It covered 38 days—from February 26 to April 5. The

[1] Received March 27, 1931.

[2] Adults of this material were kindly identified as *Gypona octolineata* Say, var. *striata* Burm., by Dr. Herbert Osborn.

temperatures in the greenhouse during this period ranged from 75° to 85°F. As stated, the leafhopper was confined upon the host plant in a small celluloid cage, but in order that it might have reasonably good host material, it was moved to a fresh leaf every four or five days. The duration of the five nymphal stages, increasing in length with each instar, were 1, 4, 5, 10, and 18 days, respectively.

The main purpose of this brief article is to record the apparent protective mimicry which is enjoyed by the nymphs of this species when they follow their normal feeding habits. When placed upon the plants many of them soon found their way to the base of the petioles of the leaves and at this point they so closely resembled the stipules (Figure 1, **A**) that anyone unaccustomed to looking for them would have had considerable difficulty in finding them. They moved about very little after they had settled down for feeding on the stem. In one instance an individual was known to have fed for three weeks in the same position. This was determined from microscopic sections of the plant material to which this individual was exposed during the period. Feeding on the stem takes place with the head downward and with the abdomen pointing upward and curving outward from the stem. In this position the leafhopper is very similar in appearance to the stipules of the plant, which are of the same green color as the nymphs.

ENTOMOLOGY.—*A revisional study of the genus* Pseudopityophthorus *Sw. in North America.*[1] M. W. BLACKMAN, Bureau of Entomology, U. S. Department of Agriculture. (Communicated by HAROLD MORRISON.)

In a former paper on the genus *Pityophthorus* Eichh. and its allies in North America the writer (1928) treated in detail the taxonomy of the genera *Myeloborus* Blackm., *Pityophthorus* Eichh., *Pityoborus* Blackm., and *Pityophilus* Blackm., gave keys to the genera of the Pityophthori (which includes *Conophthorus* Hopk., *Pseudopityophthorus* Sw., and *Gnathotrichus* Eichh. in addition to those just mentioned), and discussed in a general way the relationships of these various genera. The present paper should be considered as a continuation of the larger paper and deals with the genera *Pseudopityophthorus* Sw., while another paper on *Gnathotrichus* Eichh. will follow immediately.

This paper is based upon a study of the Scolytid material in the National Museum and in the writer's own collection.

[1] Received April 16, 1931.

The Genus *Pseudopityophthorus* Swaine

The genus *Pseudopityophthorus* was described by Swaine (1918) as follows: "The antennal club with strongly arcuate sutures, the distal segments much wider than the first; the tibia coarsely serrate; the elytra not striate, irregularly finely punctulate; the intercoxal process of the prosternum elongate; the *male* with the front clothed with long arcuate yellow hairs. Allied to *Pityophthorus* Eichh., in which it has been included."

This description applies with exactness to the type species which is designated as *P. minutissimus* Zimmermann (1868) and applies reasonably well to all of the species in Division AA of the key on a succeeding page of the present paper. However, it does not apply in its entirety to the species in Division A, only one of which (*P. asperulus* Lec.) was known at the time Swaine's genus was erected. The members of this division differ in being usually smaller, with a more slender body, with the elytral punctures sparser and either in regular or nearly regular strial rows, with the declivity less strongly impressed, and with the septa of the antennal club subtransverse.

Before the erection of the genus *Pseudopityophthorus* by Swaine (1918) several species had been described and had been assigned to various genera by different authors.

P. pubipennis was first described by LeConte (1860) under the name of *Bostrichus pubipennis* from San Jose, Calif. Later LeConte (1868) referred it to the genus *Cryphalus* Er. and still later (1876) to *Pityophthorus* Eichh.

P. minutissimus Zimm. was described in 1868 as of the genus *Crypturgus* Er. LeConte (1868) transferred it to *Cryphalus* Er. and later (1876) to *Pityophthorus*.

P. asperulus Lec. was described by LeConte (1868) under the name of *Cryphalus asperulus*. Later the same author (1876) transferred it to *Pityophthorus*. Eichhoff (1878) retained it in *Pityophthorus* and placed it close to the other forms now included in *Pseudopityophthorus*. Schwarz (1886) referred to this species as *Gnathotrichus asperulus* and later writers, including Swaine (1909, 1918), have followed him. *Pseudopityophthorus gracilus* Blackm. described by the writer in 1921 should be regarded as a synonym of *asperulus* Lec.

P. pruinosus was described by Eichhoff (1878) from "Carolina" as of the genus *Pityophthorus*. *Pityophthorus querciperda* described by Schwarz (1888) is identical, as has been pointed out by Eichhoff and Schwarz (1896).

Pityophthorus tomentosus was described by Eichhoff (1878) from "America borealis." This species has never been recognized with certainty since, and to the present writer it seems probable that it was based on an aberrant specimen of *P. pruinosus*.

The form described as *Cryphalus pilosus* (*pilosulus*) by LeConte (1868) was by him later (1876) transferred to *Pityophthorus*, in which it was retained by Eichhoff (1878) and Swaine (1909). In 1918 Swaine placed it among the species in his genus *Pseudopityophthorus*. An examination of the type of this species indicates that it belongs to neither *Pityophthorus* nor *Pseudopityophthorus*.

Harris (1837) described *Tomicus pusillus*. LeConte (1868) suggested that this species may be identical with *minutissimus* Zimm., and Eichhoff (1878) placed the latter name as a synonym of *Pityophthorus pusillus* Har. The species described by Harris can not be recognized at the present time. The description is rather general and might equally well be applied to several small Scolytids occurring in the Northeastern States and in fact has been used by various authors for species in several genera of bark beetles. The single specimen from which the description was prepared never formed a part of Harris's own collection and has apparently long since been lost.

KEY TO THE SPECIES OF PSEUDOPITYOPTHORUS SW.

A. Body more slender, more than 2.9 times as long as wide; elytra moderately to narrowly rounded behind, the punctures sparse to moderately numerous, in regular or nearly regular rows; declivity with second interspace weakly flattened; antennal club with septa of sutures 1 and 2 subtransverse.

B. Front of head in male narrow, flattened, not fringed with long hairs; that of female with a frontal elevation; antenna with club nearly twice as long as funicle; pronotum more than 1.2 times as long as wide; smaller, less than 1.25 mm. long.....**asperulus** Lec.

BB. Front of head in male fringed with long hairs; antennal club less than 1.7 times as long as funicle; pronotum less than 1.15 times as long as wide; larger, more than 1.3 mm. long.

C. Elytra narrowly rounded behind; sides of pronotum not strongly constricted before the middle; antennal club with segments 2 and 3 subequal in width.

D. Smaller, less than 1.4 mm. long; pronotal summit not markedly lighter in color; elytral hairs nearly uniform, fine, short, semierect; Southeastern States.....**fagi,** *n. sp.*

DD. Larger, more than 1.7 mm. long; pronotal summit notably lighter in color; elytral hairs more abundant, those from the interspaces coarser, longer, and more erect.

E. Pronotum with disc moderately shining, distinctly pubescent; elytra with hairs from the interspaces very long; declivity without granules; Southeastern States.....**pubescens,** *n. sp.*

EE. Pronotal disc brightly shining, subglabrous; elytra with interspacial hairs moderately long; declivity with interspaces finely granulate; Southwestern States.....**granulatus,** *n. sp.*

CC. Elytra moderately rounded behind; sides of pronotum arcuate behind, strongly constricted before the middle; antennal club widest through third segment.....**agrifoliae,** *n. sp.*

AA. Body stouter, less than 2.8 times as long as wide; elytra moderately to broadly rounded behind, the punctures irregular, very fine and close; declivity distinctly, often strongly impressed at each side of suture; antennal club with septa of sutures 1 and 2 strongly arcuate except in *minutissimus.*

B. Smaller, less than 1.85 mm. long; elytra moderately rounded behind; pubescence very fine, short, appressed; antennal club with segments 2 and 3 subequal in width.

C. Elytral pubescence uniform, not notably different on declivity; declivity faintly impressed at each side of suture; front of head broadly plano-concave; antennal club with septa of sutures 1 and 2 weakly arcuate; Eastern States.....**minutissimus** Zimm.

CC. Elytral pubescence broader and more scalelike on the declivity; declivity distinctly impressed at each side of suture; front of head broadly plano-convex; antennal club with septa of sutures 1 and 2 moderately arcuate; Southwestern States.....**pulvereus,** *n. sp.*

BB. Larger, more than 1.85 mm. long; elytra broadly rounded behind, pubescence coarser and longer, with longer hairs on certain discal interspaces and on the declivity; antennal club widest through the third segment, with septa of sutures 1 and 2 strongly arcuate.

C. Front of head in male with an impunctate, shining, median callus; pronotum with sides feebly constricted before the middle, anterior margin very broadly rounded, disc moderately to brightly shining, more deeply, less closely punctured.

D. Elytral pubescence dense, rather short and stout, that on the declivity longer on the first and third interspaces; smaller; Eastern States.....**pruinosus** Eichh.

DD. Elytral pubescence less dense, longer and more slender, the longer hairs on the declivity slender, long, and conspicuous, but often abraded; usually much larger; Western States.

E. Disc of pronotum brightly shining, more sparsely punctured, devoid of pubescence; elytra less densely punctured, pubescence sparser; declivital hairs longer, finer, and more abundant; female frons with faint longitudinal carinal line **yavapaii,** *n. sp.*

EE. Disc of pronotum moderately shining, rather closely punctured, with very short hairs; elytra densely punctured and pubescent; declivital hairs shorter, coarser, and less abundant; female frons with small impunctate area above epistomal margin **pubipennis** Lec.

CC. Male frons without median callus; pronotum with sides strongly constricted before the middle, anterior margin narrower, the disc opaque, more closely and deeply punctured; elytra with the longer hairs of declivity rather stout.....**opacicollis,** *n. sp.*

Pseudopityophthorus asperulus Lec.

Figs. 1 and 2.

Description of the adult male.—Dark brown to black with the summit of the pronotum reddish-brown; 1.14 to 1.4 mm. long, slightly more than three times as long as wide.

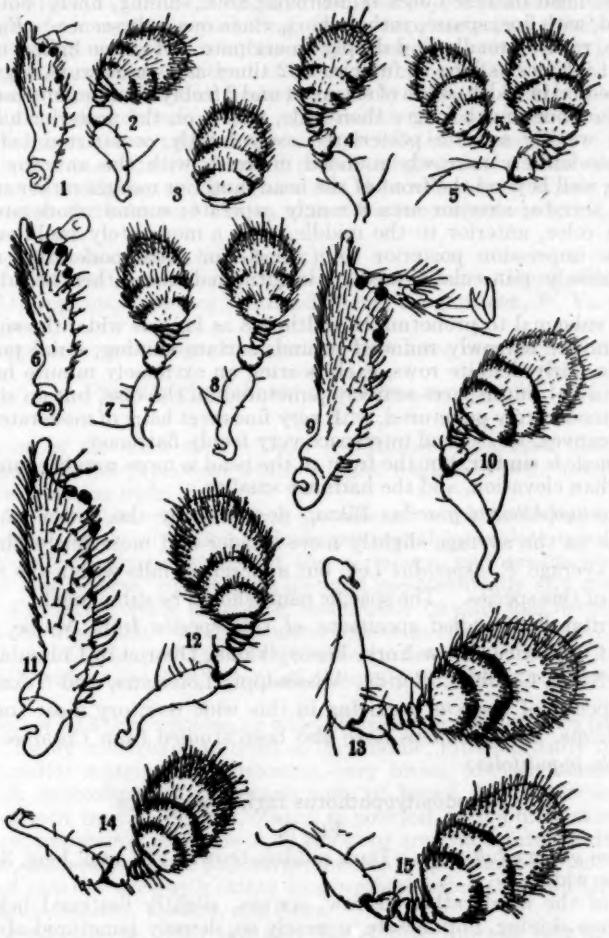

Fig. 1. Fore tibia of *Pseudopityophthorus asperulus* Lec.—Fig. 2. Antenna of *P. asperulus* Lec.—Fig. 3. Antenna of *P. fagi* n. sp.—Fig. 4. Antenna of *P. pubescens* n. sp.—Fig. 5. Antenna of *P. granulatus* n. sp. male, 5a female.—Fig. 6. Fore tibia of *P. minutissimus* Zimm.—Fig. 7. Antenna of *P. minutissimus* Zimm.—Fig. 8. Antenna of *P. agrifoliae* n. sp.—Fig. 9. Fore tibia of *P. pulvereus* n. sp.—Fig. 10. Antenna of *P. pulvereus* n. sp.— Fig. 11. Fore tibia of *P. yavapaii* n. sp.—Fig. 12. Antenna of *P. yavapaii* n. sp.—Fig. 13. Antenna of *P. pruinosus* Eichh.—Fig. 14. Antenna of *P. pubipennis* Lec.—Fig. 15. Antenna of *P. opacicollis* n. sp.

All figures were made by the writer from preparations mounted in balsam, using a compound microscope and a camera lucida. All are magnified about 112 diameters.

Front of head flattened on a semicircular area, shining, finely, not closely punctured, with fine, sparse, rather short, cinereous pubescence. *Eye* finely granulate, rather broadly and deeply emarginate. *Antenna* lighter in color; the club 1.9 times as long as funicle, 1.32 times as long as wide, segments 2 and 3 subequal in width, septa of sutures 1 and 2 feebly arcuate, subtransverse.

Pronotum one-fourth longer than wide, widest on the posterior half, with the sides weakly arcuate posteriorly, very faintly constricted before the middle, moderately narrowly rounded in front, with the anterior portion extending well beyond the front of the head; anterior margin rather strongly, regularly serrate; anterior area strongly asperate; summit moderate, much lighter in color, anterior to the middle, with a moderately well-developed, transverse impression posterior to it; posterior area moderately shining, finely, sparsely punctulate, median longitudinal line rather broad, feebly elevated.

Elytra subequal to pronotum in width, 1.8 as long as wide; the sides subparallel, rather narrowly rounded behind; surface shining; strial punctures minute, in fairly definite rows, each bearing an extremely minute hair (not usually visible); interspaces scarcely punctured on the disc, but on sides and declivity moderately punctured, with very fine erect hairs of moderate length. *Declivity* convex, the second interspace very feebly flattened.

The *female* is similar, but the front of the head is more roughly punctured, has a median elevation, and the hairs are smaller.

Pseudopityophthorus gracilus Blkm., described by the writer from Mississippi, is on the average slightly more slender and more finely punctured than the average *P. asperulus* Lec. but apparently falls within the range of variation of this species. The specific name should be submerged.

The writer has studied specimens of this species from Maine, Massachusetts, Connecticut, New York, Pennsylvania, District of Columbia, West Virginia, North Carolina, Florida, Mississippi, Louisiana, and Texas. The various species of *Quercus* occurring in this wide territory most commonly serve as hosts, but specimens have also been studied from *Castanea dentata* and *Betula populifolia*.

Pseudopityophthorus fagi, new species

Fig. 3.

Description of the adult male.—Dark reddish-brown; 1.37 mm. long, 3.0 times as long as wide.

Front of the head rather narrow, convex, slightly flattened below, the median area shining, impunctate or nearly so, densely punctured above and at the sides, and ornamented with rather long yellowish hairs which are strongly incurved and directed toward the center. *Eye* finely granulate, the inner line strongly emarginate. *Antenna* considerably lighter in color, club more than one-half longer than funicle, about one-third longer than wide, second and third segments subequal in width, septa sub-transverse.

Pronotum 1.15 as long as wide, the sides subparallel, faintly constricted in front of the middle, broadly rounded in front; anterior margin slightly extended, with numerous, subequal, regular serrations; anterior area finely asperate; summit moderately elevated, with the transverse impression posterior to it feebly developed; posterior area feebly shining, finely but rather deeply punctured, median longitudinal line scarcely elevated.

Elytra about equal in width to pronotum, 1.8 times as long as wide; the

sides subparallel as far as the origin of the declivity, rather narrowly rounded behind; surface moderately shining, finely rugulose; strial punctures very fine, in slightly irregular rows; interspaces rugulose, very finely punctured. *Declivity* convex, very faintly flattened, interspaces 1 to 3 very minutely granulate-punctate. Elytral pubescence only slightly better developed on the declivity, more abundant than in *asperulus*, the hairs from the interspaces slightly longer, coarser and more erect, especially on the declivity.

The *female* is similar in size and proportions, with the front of the head wider, convex, shining, and impunctate in the median area, closely and finely punctured at the sides and above, with a few inconspicuous hairs; declivital granules absent.

Type.—Cat. No. 43423, U. S. N. M.

Type, allotype, and four paratypes bear the labels—"Hopk. W. Va. 7142 a a; A. D. Hopkins, Collector; Midland Farm, Morgantown, W. Va.; Nov. 26, '96; Fagus."

The type series of six specimens are all that have been seen by the writer.

Pseudopityophthorus pubescens, new species

Fig. 4.

Description of the adult male.—Dark reddish-brown, almost black, except the summit of the pronotum which is light reddish-brown; 1.8 mm. long; 2.9 times as long as wide.

Front of head plano-concave on an approximate circle extending from eye to eye, surface moderately shining, finely punctured, granulate-rugulose, more strongly and closely punctured at the periphery, and ornamented with a fringe of long, coarse, yellow hairs directed meso-ventrally and masking the frons. *Eye* rather finely granulate, moderately broadly and deeply emarginate on the inner line. *Antenna* much lighter in color, the club 1.65 longer than funicle, 1.32 longer than wide, third segment slightly wider than second and much wider than first; septa of sutures 1 and 2 subtransverse, weakly arcuate.

Pronotum 1.13 times as long as wide, the sides on the posterior half weakly arcuate, feebly constricted in front of the middle, rather broadly rounded in front; anterior margin with numerous, very broad, low serrations; anterior area with approximately concentric rows of broad, low asperities; summit reddish-brown, moderately low, central in position, with a moderately strong, transverse impression posterior to it; posterior area moderately shining, with very fine, moderately close punctures; median longitudinal line not elevated; sides and anterior area with rather long upright hairs, those on the disc less conspicuous, sparser, shorter, and finer.

Elytra subequal in width, one and three-fourth times as long as wide, the sides subparallel, moderately narrowly rounded behind; surface feebly shining, rugulose; the strial punctures very fine, in fairly definite rows, with short, reclinate, cinereous hairs; punctures of interspaces still more minute, more numerous, irregular in arrangement, giving origin to much longer, erect, fine hairs. *Declivity* convex, faintly impressed at each side of suture; strial hairs broad and more scalelike, the longer hairs shorter and thicker than on the disc and sides.

The *female* is similar, but the front of the head is not so strongly and broadly flattened, the punctures and pubescence are more evenly distributed, and the hairs are shorter and much finer.

Type.—Cat. No. 43424, U. S. N. M.

Type and one paratype bear the labels—"Hopk. U. S., 3040; Tryon, N. C.;

Castanea dentata; W. F. Fiske, Collector;" allotype and two paratypes—"Hopk. U. S. 2546-b; W. F. Fiske, Coll.; Tryon, N. C.; Dec. 16, '03; Quercus rubra;" six paratypes—"Hopk. U. S., 575; Carter Bridge, Va., White oak."

Pseudopityophthorus granulatus, new species

Figs. 5 and 5a.

Description of the adult male.—Very dark brown to black, with the summit of the pronotum light reddish-brown; 1.8 mm. long, 3.1 times as long as wide.

Front of the head broadly flattened, feebly concave at the center, finely, moderately sparsely punctured, with a few, fine, moderately long, cinereous hairs, the frons more or less masked by a wisp of coarser, longer, bright yellow hairs originating from the top of the head and extending downward. *Eye* finely granulate, the inner line rather deeply emarginate. *Antenna* lighter in color, the club 1.6 times as long as the funicle, 1.4 times as long as wide, the second and third segments subequal in width, the septa subtransverse.

Pronotum 1.1 times as long as wide, widest on the posterior half, the sides subparallel behind, scarcely at all constricted before the middle, moderately broadly rounded in front; the anterior margin with numerous subequal, fine, regular serrations; anterior area finely asperate; summit low, with scarcely any transverse depression posterior to it, bright reddish brown, contrasting sharply with the very dark brown to black of the rest of pronotum and elytra; posterior area brightly shining, moderately finely punctured, median impunctate line slightly elevated.

Elytra about equal in width to pronotum, 1.9 times as long as wide; the sides subparallel as far back as the declivity, rather narrowly rounded behind; the surface moderately shining, finely rugulose; the strial punctures very minute, in regular rows, each bearing a short, semierect hair; the interspaces with the punctures more sparse, still more minute, the hairs longer, more erect, and coarser. *Declivity* convex, the suture scarcely elevated, with a sparse row of fine but distinct granules; second interspace slightly flattened, for the most part smooth, but with from two to four small granules in each; third interspace with four to six granules; the interstrial hairs only slightly longer on the declivity.

Type.—Cat. No. 43425, U. S. N. M.

Type allotype, and 54 paratypes bear the labels—"Prescott, N. F., Ariz., VI–10–30; M. W. Blackman collector; Hopk. U. S. 20404 R,; Quercus:" one paratype—"S. Rita Mts., 13–6, Ar.; coll. Hubbard and Schwarz."

The type series of more than 50 specimens does not show the usual secondary sexual differences. The *frons* in all of the specimens is flattened and ornamented as described above, with but little differences in the sculpture and pubescence. It would seem nearly certain, however, that both sexes are represented, as all but one specimen were taken by the writer from recently started burrows in oak twigs. Certain specimens are, however, slightly smaller, show slightly finer sculpture, have a smaller antennal club and slightly sparser frontal pubescence, and these are believed to be females.

Pseudopityophthorus agrifoliae, new species

Fig. 8.

Description of the adult male.—Dark reddish-brown; 1.97 mm. long, 2.95 times as long as wide.

Front of the head convex, slightly flattened below; with moderately fine,

deep punctures, with long, incurved, yellow, frontal hairs arising principally from the peripheral area at the sides and above. *Eye* finely granulate, moderately emarginate. *Antenna* much lighter in color, club 1.69 times as long as funicle, 1.3 times as long as wide; widest through the third segment, the second and first progressively narrower; septa subtransverse.

Pronotum 1.06 times as long as wide, widest behind the middle, the sides decidedly arcuate, distinctly constricted in front of the middle, moderately broadly rounded in front; anterior margin with numerous, regular, low serrations, those at the sides at least as coarse as those near the middle; anterior area with numerous asperities in slightly irregular concentric rows, becoming much smaller toward the summit; summit slightly higher than in *minutissimus*, with the transverse impression stronger; posterior area moderately shining, closely, very finely punctured, and finely rugulose; median line rather feebly elevated.

Elytra as wide as pronotum, 1.8 times as long as wide, with the sides subparallel as far back as the declivity, moderately rounded behind; surface moderately shining, finely rugulose; minutely and subregularly punctured, with indications of strial rows on the disc and sides, the pubescence cinereous, fine, short, often abraded. *Declivity* convex, suture feebly elevated; second interspace flattened, devoid of pubescence in the middle third, pubescence on declivity slightly longer.

Type.—Cat. No. 43426, U. S. N. M.

Type and two paratypes bear the labels—"Hopk. U. S., 11[a]; A. D. Hopkins, coll.; Golden Gate Park, Cal.; Apr. 20, 1899; Quercus agrifolia."

Pseudopityophthorus minutissimus Zimm.

Figs. 6 and 7.

Description of the adult male.—Dark reddish-brown; about 1.5 to 1.86 mm. long, 2.77 times as long as wide.

Front of head very broadly plano-concave on a subcircular area extending from eye to eye, surface very finely and densely reticulate, the central portion impunctate, punctured peripherally, and ornamented with rather coarse, long, incurved yellow hairs; epistomal margin broadly emarginate. *Eye* finely granulate, inner line emarginate. *Antenna* somewhat lighter in color, club 1.75 times as long as funicle, 1.4 times as long as wide, segments 2 and 3 subequal in width, the first much narrower, septa of sutures 1 and 2 subtransverse.

Pronotum slightly longer than wide, the sides behind subparallel, feebly arcuate, feebly constricted before the middle, rather broadly rounded in front; anterior margin with numerous sharp, regular serrations; anterior area strongly asperate, summit rather low, usually concolorous, with the transverse impression weak; posterior area subopaque to moderately shining, surface finely reticulate, very finely punctured, median longitudinal line feebly elevated.

Elytra as wide as pronotum, 1.68 times as long as wide, the sides subparallel, moderately rounded behind; surface feebly shining, finely rugulose; irregularly, minutely punctured, with little evidence of arrangement in strial rows, each puncture bearing a fine, short, reclining, cinereous hair, often abraded. *Declivity* convex, the suture narrow and feebly elevated, faintly flattened at each side; pubescence not notably longer or coarser.

The *female* is of about the same size and proportions, with the frontal serrations and asperities slightly finer; front of head not so widely or strongly flattened, finely and densely punctured and ornamented with very fine cinereous pubescence of moderate length, which is shorter and sparser in the median epistomal area.

This species is widely distributed and varies considerably in various localities and hosts but a long series from one locality will often show nearly the entire range of variation. As a usual thing specimens from a colder climate seem to be larger as shown by a series from West Point, New York, and another from Ute Pass, Colorado. At West Point the maximum size of 1.86 mm. is attained and the average of the series of 24 specimens is well above 1.7 mm. In series from farther south only occasional specimens exceed 1.6 mm. in length.

The writer has studied many hundreds of specimens from Massachusetts, Connecticut, New Jersey, Pennsylvania, Colorado, Maryland, District of Columbia, West Virginia, Virginia, Tennessee, Mississippi, North Carolina, and Georgia. This bark beetle breeds most commonly in the various species of *Quercus*, but specimens have also been studied from *Castanea*, *Betula*, *Fagus*, *Carpinus*, *Ostrya*, *Hicoria*, *Cornus*, *Hammamelis*, *Amelanchier*, and *Pinus* (?).

Pseudopityophthorus pulvereus, new species

Figs. 9 and 10.

Description of the adult male.—Dark reddish-brown; 1.67 mm. long, 2.76 times as long as wide.

Front of the head broadly plano-convex, weakly, transversely impressed above the epistomal margin, with a median shining callus, finely and closely punctured at the sides and above, and ornamented with long, rather coarse, yellow hairs masking the frons. *Eye* finely granulate, the inner line strongly emarginate. *Antenna* somewhat lighter in color, the club twice as long as wide, the second and third segments subequal in width, the septa moderately arcuate.

Pronotum 1.1 times as long as wide, the sides subparallel on the posterior half, feebly constricted before the middle, broadly rounded in front; anterior margin with numerous, rather broad, low serrations; anterior area moderately asperate; summit low and the posterior transverse impression very weak; posterior area shining, very finely, rather sparsely punctulate, the median longitudinal line feebly elevated.

Elytra about as wide as pronotum, 1.68 times as long as wide, the sides subparallel, moderately rounded behind; surface subopaque to feebly shining, finely rugulose, closely, irregularly, minutely punctured, with no evidence of strial rows; each puncture on the disc and sides bearing a fine, short, reclining hair. *Declivity* convex, the suture slightly elevated, the region of the second interspace distinctly impressed; pubescence flattened and more scalelike.

The *female* is similar in size and proportions, but with the front of the head less strongly flattened, without a shining callus, finely, moderately closely punctured and ornamented with very fine, moderately long, cinereous hairs of nearly uniform length.

Type.—Cat. No. 43427, U.S.N.M.

The type and three paratypes bear the labels—"Hopk. U. S. 5580; Nov. 11, '07; J. L. Webb coll.; Chiracahua Reserve, Ariz.; Quercus:" allotype—"S. Rita Mts., 26.5, Ar.; coll. Hubbard and Schwarz."

Pseudopityophthorus pruinosus Eichh.
(Pityophthorus querciperda Sz.)

Figs. 13 and 14.

Description of the adult male.—Reddish-brown; 1.93 mm. long, 2.79 times as long as wide.

Front of head broadly flattened, the median area elevated, shining, impunctate, densely punctured at sides and above, and ornamented with a dense fringe of long, moderately coarse, yellow, converging hairs which mask the frons. *Eye* finely granulate, narrowly emarginate. *Antenna* considerably lighter in color, the club 1.75 times as long as funicle, 1.37 times as long as wide, the third segment wider than second and nearly twice as wide as first, the septa strongly arcuate.

Pronotum 1.1 times as long as wide, the sides subparallel, faintly arcuate behind, slightly constricted anterior to the middle; moderately broadly rounded in front; the anterior margin with numerous fine serrations; anterior area finely asperate, the asperities finer and reddish toward the summit, which is low; posterior area rather sparsely, finely punctured, moderately shining, nearly glabrous.

Elytra scarcely wider than pronotum, the sides subparallel, broadly rounded behind, surface finely, irregularly, rather densely punctured, with the abundant pubescence short and stout, less abundant near suture and more slender toward the sides of the disc. *Declivity* convex, distinctly impressed at each side of the suture, the pubescence longer and more erect on all the interspaces except the second.

The *female* is similar in size, proportions, and general appearance, but with the front of the head more convex, finely, closely punctured, and ornamented with very slender, rather short, cinerous hairs.

The above description is based partly upon a specimen from Eichhoff's type series of *P. pruinosus* and partly upon the type series of *P. querciperda* Schwarz. In connection with these the author has studied hundreds of specimens in the United States National Museum collection and in his private collection.

This species is widely distributed over the eastern portion of the country from Michigan and New York to Texas and Florida. The writer has studied specimens from Michigan, New York, New Jersey, Pennsylvania, District of Columbia, West Virginia, Tennessee, North Carolina, South Carolina, Georgia, Mississippi, Louisiana, Texas, and Florida. The various species of *Quercus* most commonly serve as the hosts, but specimens from *Castanea*, *Fagus*, *Hicoria*, *Carpinus*, *Ostrya*, *Acer*, and *Pinus* (?) have been examined, and all come within the limits of the species.

Probably *Pityophthorus tomentosus* Eichh. should also be considered as a synonym of *P. pruinosus* Eichh. from which it was said by Eichoff to differ especially in the pronotum being sub-inflated posteriorly. Such variations are not uncommon in long series of *pruinosus*.

Pseudopityophthorus yavapaii, new species

Figs. 11 and 12.

Description of the adult male.—Dark reddish-brown with the disc of pronotum and often that of elytra lighter in color; 2.23 mm. long, 2.69 times as long as wide.

Front of the head broadly flattened from eye to eye, transversely impressed above the epistomal margin, with a median, shining, impunctate callus; the peripheral portion finely, closely punctured, and bearing hairs, those toward the center cinereous, rather fine, and of medium length, those from the outside,

bright yellow, coarser, much longer, and converging over the frons so as to mask it. *Eye* finely granulate, the inner line deeply and broadly emarginate. *Antenna* much lighter in color; the club 1.75 times as long as funicle, 1.38 times as long as wide; widest through the third segment, with the second and first progressively narrower; septa strongly arcuate.

Pronotum slightly longer than wide, the sides subparallel, weakly arcuate behind, feebly constricted before the middle, broadly rounded in front; anterior margin with very low serrations (weaker than in *pubipennis*); anterior area with the numerous asperities very broad and low, summit low, and transverse impression weak; posterior area brightly shining, the punctures fine, more sparse than in *pubipennis*, the disc glabrous, the pubescence on the sides and in the asperate area short and much sparser than in *pubipennis*; median longitudinal line broad, not elevated.

Elytra nearly equal to pronotum in width, 1.68 times as long as wide; the sides subparallel, broadly rounded behind; surface shining; finely, moderately closely, irregularly punctured (more coarsely and less densely than in *pubipennis*); the pubescence similar to that of *pubipennis* but sparser. *Declivity* similar to *pubipennis*, but with the erect hairs longer, finer, and more numerous; the suture scarcely elevated, with a sparse row of minute granules.

The *females* average slightly smaller than the males, are similar in general proportions and sculpture, but have the long hairs on the declivity not so well-developed; the front of the head is less broadly flattened, devoid of the median impunctate callus, but with faint indications of a median, longitudinal carina; the hairs are finer, shorter, and evenly distributed.

Type.—Cat. No. 43428, U.S.N.M.

Type, allotype, and 112 paratypes bear the labels—"Prescott, N. F., Ariz. VI-10-30; M. W. Blackman, collector; Hopkins U. S. 20404-Q; Quercus:" 19 paratypes—"Hopk. U. S. 5580; J. L. Webb, collector; Chiricahua Reserve, Ariz.; Live oak:" two paratypes—"Hopk. U. S. 7189; M. Chrisman, collector; Bred, 8-9-08:" three paratypes—"Hopk. U. S. 7706; M. Chrisman, collector; Sta. Catalina Mts., Ariz.; Black Jack:" two paratypes—"S. Rita Mts., Ariz., 6-6; coll. Hubbard and Schwarz;" one paratype—"Chiric. Mts., Ariz. 19-6; coll. Hubbard and Schwarz:" one paratype—"Arizona, Morrison; coll. Hubbard and Schwarz."

Pseudopityophthorus pubipennis Lec.

Fig. 14.

Description of the adult male.—Reddish-brown to nearly black; 2.1 to 2.3 mm. long, 2.75 times as long as wide.

Front of head broadly flattened, with a median, shining, smooth callus, the periphery finely, densely punctured and ornamented with a dense fringe of long, rather coarse, yellow hairs which extend downward and converge, masking the frons. *Eye* finely granulate, the inner line deeply and widely emarginate. *Antenna* somewhat lighter in color, the club about twice as long as funicle, about one-third longer than wide, widest through the third segment, with the second and first progressively narrower; the septa arcuate.

Pronotum slightly longer than wide, the sides rather weakly arcuate posteriorly, faintly constricted well before the middle, broadly rounded in front; anterior margin with numerous rather broad low serrations; anterior area with numerous broad low asperities; summit low with only a weak transverse impression posterior to it; summit and disc much lighter in color; posterior area moderately shining, finely, moderately closely punctured with a few very short hairs (often abraded on the disc), the sides with longer hairs; median longitudinal line broad, scarcely elevated.

Elytra about equal in width, 1.66 times as long as wide, the sides subparallel, broadly rounded behind; surface feebly shining, irregularly, very finely and densely punctured, rather densely clothed with cinereous recumbent hairs, with a few, longer, more erect ones, becoming more numerous and longer on the declivity. *Declivity* convex, moderately abrupt, slightly depressed at each side of the suture.

The *female* is similar in general proportions, but with the frons not so broadly flattened, and ornamented with rather fine cinereous hairs of moderate length, evenly distributed except on a small, shining, impunctate area just above the epistomal region.

The foregoing description was prepared from specimens compared with LeConte's type series.

This species is western in its distribution, the type series having been collected in California. The writer has examined several hundreds of specimens from California, Oregon, and Washington. All are from the various western species of *Quercus*.

Pseudopityophthorus opacicollis, new species

Fig. 15.

Description of adult male.—Dark brown; 2.18 mm. long, 2.7 times as long as wide.

Front of the head flattened from eye to eye, without median callus but with a median, impunctate, shining area just above the epistomal margin, the rest of the frons punctured and bearing hairs, those at outside much longer, coarse, and yellow, converging over and masking the frons. *Eye* finely granulate, rather deeply and widely emarginate. *Antenna* lighter in color, club more than twice as long as funicle, 1.5 times as long as wide; the third segment slightly wider than second, the first much narrower; septa strongly arcuate.

Pronotum scarcely longer than wide, widest behind the middle, with the sides subparallel on the posterior half; strongly constricted before the middle, moderately rounded in front; anterior margin with numerous rather broad, low serrations; anterior area with approximately concentric rows of rather coarse asperities, which are gradually reduced to concentric rugae on the rather low summit; posterior area subopaque, closely, finely, and deeply punctured, slightly more coarsely and sparsely on the sides; median longitudinal line scarcely elevated behind, more strongly anteriorly in the broad, shallow, transverse impression; pubescence on anterior area and sides moderately short, that on the disc shorter and finer.

Elytra similar in width to pronotum, 1.7 times as long as wide; the sides subparallel, moderately rounded behind; surface subopaque or feebly shining, rugulose; the punctures fine, rather dense, iregular, with no indications of strial lines on the disc; pubescence short, rather stout, reclining, with a very few, longer, more erect hairs on the suture and region of third interspace. *Declivity* convex, impressed at each side of the slightly elevated suture; suture and third interspace bearing longer, coarser, more erect hairs.

The *female* is of similar proportions, but the front of the head is not so strongly flattened, the median area just above the epistomal margin shining and impunctate, rather closely and finely punctured, and ornamented with fine hairs of moderate length at the sides and above.

This species is rather closely allied to both *pubipennis* Lec. and *yavapaii*.

new species, but is readily distinguished by the shape and sculpture of the pronotum, the character of the longer elytral hairs, and by other differences brought out in the descriptions.

Type.—Cat. No. 43429, U.S.N.M.

Type, allotype, and four paratypes bear the labels—"Hopk. U. S. 5644; reared Sept. 1, 08; J. L. Webb, colr.; Sta. Catalina Mts. Ariz.;Quercus:" five paratypes—"Hopk. U. S. 7199h, 4–15–08; M. Chrisman, colr.; Sta. Catalina Mts., Ariz.; Quercus:" 23 paratypes—"Hopk. U. S. 10366-b; reared Sept. 25, 13; M. Chrisman, colr.; Sta. Catalina Mts., Ariz.; Quercus emoryi:" three paratypes—"Hopk. U. S. 10387; M. Chrisman colr.: Sta. Catalina Mts., Ariz.; Sept. 18–13, Quercus emoryi:" seven paratypes—"Hopk. U. S. 10519a; reared July 28, '13; M. Chrisman, colr.; Sta. Catalina Mts., Ariz.; Black jack and Buck acorn."

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PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

ANTHROPOLOGICAL SOCIETY

630TH MEETING

The 630th meeting of the Anthropological Society of Washington was held on February 17, 1931, in room 42-43 of the U. S. National Museum, President COOPER, presiding.

Program: HENRY B. COLLINS, JR., assistant curator of Ethnology, U. S. National Museum: *Archaeological explorations on St. Lawrence Island, Alaska.*—From June 20th to October 20th excavations were carried on at the sites of five abandoned Eskimo villages within a mile of Gambell, at the northwestern extremity of St. Lawrence Island, Bering Sea. The villages are situated on a gravel spit which extends westward from Cape Chibukak (Sevuokok). A series of old beach lines shows the manner in which the spit was built up, and the positions of the several old villages in relation to these former beach lines and the present sea affords preliminary evidence of their respective antiquity. The oldest site was not known to the present Eskimos. It was on the lower slope of the mountain and was completely covered over with sod, moss, and rocks. It proved to be a site of pure Old Bering Sea Culture, a very old Eskimo culture previously known only from a relatively few elaborately decorated objects of ivory that had been found at various places in northern Alaska and northeastern Siberia. Situated on the gravel spit immediately below this old village and within the three earliest beach lines, was the next oldest site, known to the Eskimos as Miyowaghameet. The lower strata of the midden yielded only Old Bering Sea material, but above it were found objects decorated in the Punuk style, which in 1928 and 1929 had been recognized as an intermediate stage between the Old Bering Sea art and the modern. The next oldest villages, Ievoghiyogameet and Seklowaghyoget had only Punuk art; there was likewise evidence of a progressive simplification in harpoon heads. At the latest site, which was not entirely abandoned until about 40 years ago, simplification of harpoon types continued, resulting finally in the modern form; art was also of the modern type. Ten houses were excavated, one or more at each old village, showing that three types of houses had been in use on St. Lawrence Island in prehistoric times. Additional evidence of the relation of the Thule and Old Bering Sea cultures was afforded by the finding of Thule harpoon heads only at the three latest villages. (*Author's Abstract.*)

FRANK H. H. ROBERTS JR., *Secretary.*

SCIENTIFIC NOTES AND NEWS

A. WETMORE has been elected an honorary member of the Societé Orthologique et Mammalogique de France.

The Langley Gold Medal for Aerodromics has been presented by the Regents of the Smithsonian Institution to Admiral EVELYN BYRD.

Through a cooperative arrangement between the Physikalische-Technische Reichsanstalt and the National Bureau of Standards, an exchange of personnel has been arranged for the purpose of promoting work on fundamental

standards. Dr. F. HENNING of the Physikalische-Technische Reichsanstalt is studying at the Bureau of Standards the proposal of the Bureau that the emission from a black body at the freezing point of platinum be adopted as the primary standard of light. Dr. HENNING will take part in measurements of the emission of a black body at the freezing point of platinum and also at the freezing point of iridium, if such an extension is found desirable.

Dr. G. W. VINAL of the staff of the Bureau of Standards is proceeding to the Reichsanstalt to engage in intercomparisons of the national standards of electromotive force and in work on the improvement of standard cells.

There have just been published the first three volumes of the series *The Physics of the Earth* as bulletins of the National Research Council by the Division of Physical Sciences with the cooperation of the Division of Geology and Geography and the American Geophysical Union. The volumes already published include *Volcanology*, *The Figure of the Earth*, and *Meteorology*. There is also in press a fourth volume of the series on *The Age of the Earth*, which will be issued about the middle of April.

The submarine NAUTILUS, formerly the U. S. S. O–12, was christened by Lady WILKINS at the Brooklyn Navy Yard on March 24, 1931, there being about 800 guests present to witness the ceremony. It will be recalled that this vessel is to be used by the Wilkins-Ellsworth Trans-Arctic Submarine Expedition during the coming summer.

With the cooperation of the Mountain States Telephone and Telegraph Company and the American Telephone and Telegraph Company, there is being installed at the Tucson Magnetic Observatory by the U. S. Coast and Geodetic Survey and the Department of Terrestrial Magnetism of the Carnegie Institution of Washington recording apparatus for measuring earth-currents. W. J. ROONEY of the Department of Terrestrial Magnetism is installing the apparatus at the Observatory. The two lines involved extend northward from Tucson approximately 35 miles in an air-line to Mammoth and eastward approximately 56 miles in an airline to Wilcox.

The American Physical Society held meetings April 30 and May 1, 1931, at the Bureau of Standards, Washington, D. C., and May 2 in the National Academy-Research Council Building, Washington, D. C.

The American Section of the International Scientific Radio Union held a meeting in the National Academy-Research Council Building, Washington, D. C., on May 1, 1931.